

Claims

1. A fuel cell separator having a gas permeability, measured by a method B specified under JIS K7126, in a range of $30 \text{ cc/m}^2 \cdot 24 \text{ hr} \cdot \text{atm}$ or less, said fuel cell separator being produced by a method comprising the steps of:

producing dry granules of a composition for a fuel cell separator mainly containing a conductive material, a binder, and an additive by mixing raw materials including at least said conductive material, said binder, and said additive, granulating the resultant mixture to obtain granules, and drying the granules; and

packing said dry granules in a mold, and hot-press molding said dry granules packed in the mold;

wherein a residual volatile matter content of said dry granules is in a range of 4 wt% or less;

an average particle size of said dry granules is in a range of 200 to 700 μm ; and

a particle size distribution of said dry granules is as follows:

particle size	percentage
5 μm or more and less than 100 μm	5 to 30%
100 μm or more and less than 300 μm	10 to 40%
300 μm or more and less than 500 μm	10 to 50%
500 μm or more and less than 1000 μm	balance

2. A fuel cell separator having a gas permeability, measured by a method B specified under JIS K7126, in a range 30 of 30 cc/m² · 24 hr·atm or less, said fuel cell separator being produced by a method comprising the steps of:

producing sized dry granules of a composition for a fuel cell separator mainly containing a conductive material, a binder, and an additive by mixing raw materials including 35 at least said conductive material, said binder, and said additive, granulating the resultant mixture to obtain granules, drying the granules, and sizing the dry granules; and

packing said sized dry granules in a mold, and hot-press molding said sized dry granules packed in the mold:

wherein a residual volatile matter content of said sized dry granules is in a range of 4 wt% or less;

an average particle size of said sized dry granules is in a range of 60 to 160 μm; and

a particle size distribution of said sized dry granules is as follows:

particle size	percentage
5 μm or more and less than 100 μm	10 to 80%
100 μm or more and less than 300 μm	10 to 40%
300 μm or more and less than 500 μm	balance

3. A fuel cell separator having a gas permeability, measured by a method B specified under JIS K7126, in a range of $30 \text{ cc/m}^2 \cdot 24 \text{ hr} \cdot \text{atm}$ or less, said fuel cell separator

being produced by a method comprising the steps of:

producing dry granules of a composition for a fuel cell separator mainly containing a conductive material, a binder, and an additive by mixing raw materials including at least said conductive material, said binder, and said additive, granulating the resultant mixture to obtain granules, and drying the granules; and

packing said dry granules in a mold, and hot-press molding said dry granules packed in the mold:

wherein said step of mixing raw materials including at least said conductive material, said binder, and said additive comprises the steps of:

adding and mixing said additive to and with said conductive material, to obtain a sub-mixture; adding said binder to said sub-mixture in an amount of 5 to 30 parts by mass on the basis of 100 parts by mass of said conductive material and simultaneously adding a solvent to said sub-mixture in an amount of 20 parts by mass or less on the basis of 100 parts by mass of said conductive material; and

wet-mixing said sub-mixture with said binder and said solvent.

4. A fuel cell separator having a gas permeability, measured by a method B specified under JIS K7126, in a range of $30 \text{ cc/m}^2 \cdot 24 \text{ hr} \cdot \text{atm}$ or less, said fuel cell separator being produced by a method comprising the steps of:

producing sized dry granules of a composition for a fuel cell separator mainly containing a conductive material, a binder, and an additive by mixing raw materials including at least said conductive material, said binder, and said additive, granulating the resultant mixture to obtain granules, drying the granules, and sizing the dry granules; and

packing said sized dry granules in a mold, and hot-press molding said sized dry granules packed in the mold; wherein said step of raw materials including at least said conductive material, said binder, and said additive comprises the steps of:

adding and mixing said additive to and with said conductive material, to obtain a sub-mixture:

adding said binder to said sub-mixture in an amount of 5 to 30 parts by mass on the basis of 100 parts by mass of said conductive material and simultaneously adding a solvent to said sub-mixture in an amount of 20 parts by mass or less on the basis of 100 parts by mass of said conductive material, and

wet-mixing said sub-mixture with said binder and said solvent.

5. A fuel cell separator according to any one of claims 1 to 4, wherein said step of drying the granules is carried out by a vacuum drying method, a fluid bed drying method, a jet drier method, or an elevated temperature drying method.

6. A fuel cell separator according to claim 1, wherein said conductive material is a powder of graphite which has an average particle size ranging from 10 to 80 μm .

7. A polymer electrolyte fuel cell comprising:

a plurality of unit cells juxtaposed, each of which has a pair of electrodes disposed with a polymer electrolyte membrane put therebetween, and a pair of separators disposed with said electrodes put therebetween and shaped to form gas supply/discharge passages between said separators and said electrodes;

wherein part or all of said separators in said fuel cell are composed of fuel cell separators each of which has a gas permeability, measured by a method B specified under JIS K7126, in a range of $30 \text{ cc/m}^2 \cdot 24 \text{ hr} \cdot \text{atm}$ or less, and which is produced by a method comprising the steps of:

producing dry granules of a composition for a fuel cell separator mainly containing a conductive material, a binder, and an additive by mixing raw materials including at least said conductive material, said binder, and said additive, granulating the resultant mixture to obtain granules, and drying the granules; and

packing said dry granules in a mold, and hot-press molding said dry granules packed in the mold;

wherein a residual volatile matter content of said dry granules is in a range of 4 wt% or less:

an average particle size of said dry granules is in a range of 200 to 700 μm ; and

a particle size distribution of said dry granules is as follows:

particle size	percentage
5 μm or more and less than 100 μm	5 to 30%
100 μm or more and less than 300 μm	10 to 40%
300 μm or more and less than 500 μm	10 to 50%
500 μm or more and less than 1000 μm	balance

8. A polymer electrolyte fuel cell comprising:

a plurality of unit cells juxtaposed, each of which has a pair of electrodes disposed with a polymer electrolyte membrane put therebetween, and a pair of separators disposed with said electrodes put therebetween and shaped to form gas supply/discharge passages between said separators and

said electrodes:

wherein part or all of said separators in said fuel cell are composed of fuel cell separators each of which has a gas permeability, measured by a method B specified under JIS K7126, in a range of $30 \text{ cc/m}^2 \cdot 24 \text{ hr} \cdot \text{atm}$ or less, and which is produced by a method comprising the steps of:

producing sized dry granules of a composition for a fuel cell separator mainly containing a conductive material, a binder, and an additive by mixing raw materials including at least said conductive material, said binder, and said additive, granulating the resultant mixture to obtain granules, drying the granules, and sizing the dry granules; and

packing said sized dry granules in a mold, and hot-press molding said sized dry granules packed in the mold; wherein a residual volatile matter content of said sized dry granules is in a range of 4 wt% or less;

an average particle size of said sized dry granules is in a range of 60 to 160 μm ; and

a particle size distribution of said sized dry granules is as follows:

particle size	percentage
5 μm or more and less than 100 μm	10 to 80%
100 μm or more and less than 300 μm	10 to 40%

300 μm or more and less than 500 μm

balance

9. A polymer electrolyte fuel cell comprising:

a plurality of unit cells juxtaposed, each of which has a pair of electrodes disposed with a polymer electrolyte membrane put therebetween, and a pair of separators disposed with said electrodes put therebetween and shaped to form gas supply/discharge passages between said separators and said electrodes;

wherein part or all of said separators in said fuel cell are composed of fuel cell separators each of which has a gas permeability, measured by a method B specified under JIS K7126, in a range of $30 \text{ cc/m}^2 \cdot 24 \text{ hr} \cdot \text{atm}$ or less, and which is produced by a method comprising the steps of:

producing dry granules of a composition for a fuel cell separator mainly containing a conductive material, a binder, and an additive by mixing raw materials including at least said conductive material, said binder, and said additive, granulating the resultant mixture to obtain granules, and drying the granules; and

packing said dry granules in a mold, and hot-press molding said dry granules packed in the mold:

wherein said step of mixing raw materials including at least said conductive material, said binder, and said

additive comprises the steps of:

adding and mixing said additive to and with said conductive material, to obtain a sub-mixture;

adding said binder to said sub-mixture in an amount of 5 to 30 parts by mass on the basis of 100 parts by mass of said conductive material and simultaneously adding a solvent to said sub-mixture in an amount of 20 parts by mass or less on the basis of 100 parts by mass of said conductive material; and

wet-mixing said sub-mixture with said binder and said solvent.

10. A polymer electrolyte fuel cell comprising:

a plurality of unit cells juxtaposed, each of which has a pair of electrodes disposed with a polymer electrolyte membrane put therebetween, and a pair of separators disposed with said electrodes put therebetween and shaped to form gas supply/discharge passages between said separators and said electrodes:

wherein part or all of said separators in said fuel cell are composed of fuel cell separators each of which has

a gas permeability, measured by a method B specified under JIS K7126, in a range of 30 cc/m²·24 hr·atm or less, and which is produced by a method comprising the steps of:

producing sized dry granules of a composition for a fuel cell separator mainly containing a conductive material, a binder, and an additive by mixing raw materials including at least said conductive material, said binder, and said additive, granulating the resultant mixture to obtain granules, drying the granules, and sizing the dry granules; and

packing said sized dry granules in a mold, and hot-press molding said sized dry granules packed in the mold;

wherein said step of raw materials including at least said conductive material, said binder, and said additive comprises the steps of:

adding and mixing said additive to and with said conductive material, to obtain a sub-mixture;

adding said binder to said sub-mixture in an amount of 5 to 30 parts by mass on the basis of 100 parts by mass of said conductive material and simultaneously adding a solvent to said sub-mixture in an amount of 20 parts by mass or less on the basis of 100 parts by mass of said conductive material; and

wet-mixing said sub-mixture with said binder and said solvent.

11. A polymer electrolyte fuel cell according to any one of claims 7 to 10, wherein said step of drying the

granules is carried out by a vacuum drying method, a fluid bed drying method, a jet drier method, or an elevated temperature drying method.

12. A polymer electrolyte fuel cell according to claim 7, wherein said conductive material is a powder of graphite which has an average particle size ranging from 10 to 80 μm .